

## CLAIMS

*I claim:*

1. A method for producing a pair of polarization maintaining couplers, the method comprising:
  - forming troughs in two platforms;
  - placing two fibers respectively in the troughs so that both of the platforms can be closed up as a whole part; and
  - obtaining the pair of the polarization maintaining couplers by a precision cut of the whole part somewhere in the middle thereof.
2. The method of Claim 1 further comprising bonding the two fibers in the troughs by applying a bonding agent thereto.
3. The method of Claim 2, wherein the placing of the two fibers respectively in the troughs comprises bonding the two platforms together with the two fibers therebetween.
4. The method of Claim 1 wherein each of the two fibers has a glass core for optical signals to propagate therein and the glass core is protected and surrounded by one or more outer layers.
5. The method of Claim 4, wherein the placing of the two fibers respectively in the troughs comprises:
  - stripping some of the one or more outer layers off each of the two fibers in a middle portion thereof;

securing the stripped middle portions of the two fibers respectively  
in the troughs; and  
bonding the two platforms together with the two fibers  
therebetween.

6. The method of Claim 5, wherein the troughs are of V-shape.
7. The method of Claim 6, wherein the troughs are straight to facilitate a placement of the stripped middle portions of the two fibers in the two platforms.
8. The method of Claim 6, wherein the two platforms are silicon based.
9. The method of Claim 1, wherein between the two fibers, one is a single mode fiber and the other is a polarization maintaining fiber.
10. A method for producing a pair of polarization maintaining couplers, the method comprising:
  - etching at least one trough respectively in each of two silicon structures;
  - stripping a center portion of a fiber so that the fiber can be securely positioned in the trough of the two silicon structures;
  - combining the two silicon structures with the center portion of the fiber therebetween to form a whole structure; and
  - cutting the whole structure into two parts, each becoming one of the polarization maintaining couplers.

11. The method of Claim 10, wherein the trough is of V-shape.
12. The method of Claim 10, wherein the fiber has a glass core for optical signals to propagate therein and the glass core is protected and surrounded by one or more outer layers; and wherein the stripping of the center portion of the fiber comprises stripping some of the one or more layers off the fiber for a predetermined length of the fiber.
13. The method of Claim 10, wherein the combining of the two silicon structures comprises applying a bonding agent between the two silicon structures.
14. An apparatus of using a first and second polarization maintaining couplers, the apparatus comprising:
  - a waveguide structure having a main channel and a side channel, the side channel branching out from the main channel within the waveguide structure;
  - each of the polarization maintaining couplers having two ports; and
  - wherein the waveguide structure is coupled between the polarization maintaining couplers, one of the two ports of the first polarization maintaining coupler connecting to the main channel of the waveguide structure, when a polarized light beam is coupled into the main channel via the one of the two ports of the first polarization maintaining coupler, a small amount of the polarized light beam is diverted into the side channel.

15. The apparatus of Claim 14, wherein the small amount of the polarized light beam diverted into the side channel is coupled to another one of the two ports of the second polarization maintaining coupler and output to a signal mode fiber.
16. The apparatus of Claim 14, wherein the first and second polarization maintaining couplers are configured by a method including:
  - etching at least one trough respectively in each of two silicon structures;
  - stripping a center portion of a fiber so that the fiber can be securely positioned in the trough of the two silicon structures;
  - combining the two silicon structures with the center portion of the fiber therebetween to form a whole structure; and
  - cutting the whole structure into two parts, each becoming one of the polarization maintaining couplers.
17. The apparatus of Claim 14, wherein the main channel is for communicating the polarized light.
18. The apparatus of Claim 14, wherein another one of the two ports of the polarization maintaining couplers is not used.